

Endangered Foods: Bananas

Yes! We Have No Bananas!

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THIS HIT SONG FROM THE 1920S REFLECTED A SHORTAGE brought on by the rapid spread of a lethal disease that was wiping out the vast banana plantations across Central and South America.

Originally regarded as an oddity and a luxury, advances in shipping and refrigeration soon made bananas everyone's fruit of choice, even replacing the apple in popularity. This growing trade was primarily based on a single variety, Gros Michel or 'Big Mike'. Larger and evidently better tasting than our current bananas, it was, like them, seedless and tolerant of long-distance transport.

Unfortunately, Gros Michel was also highly susceptible to Panama Disease, a wilt caused by the *Fusarium oxysporum* fungus. As the original plantations were wiped out, new areas were planted to meet demand. But the disease continued to advance and by the 1950's it had annihilated most of the Gros Michel plantations in the world.

Enter the Cavendish.

The banana industry was in crisis. They needed a new banana and found the answer in the Cavendish, the variety synonymous with today's idea of bananas. It was wonderful: seedless, able to be transported long distances, consistent flavor, and best of all, apparently immune to Panama Disease. Perfect! Thousands of acres of Cavendish bananas were planted all across the tropical and subtropical world, quickly dominating the desert banana market.

And then plants began to die.

Initially it seemed they were succumbing only where cooler temperatures stressed them but soon plants were failing even in tropical areas. It took several years to identify the problem: that old enemy, the fusarium wilt! Alas, while the Cavendish resists the fusarium strain that destroyed Gros Michel, it is not immune to TR4, a new, even nastier strain. TR4 has spread to many parts of the world and is now wiping out Cavendish plantations, just as the original Panama strain destroyed Gros Michel. And there is still no effective remedy. So far TR4 hasn't made it to the Americas, but given modern travel patterns, it is only a matter of time before it reaches our hemisphere and the Cavendish vanishes.

So once again, the hunt is on. Growers are seeking another replacement, resistant to both strains of *F. oxysporum* (plus another fungal nasty, Black Sigatoka) and meeting all the other requirements of commercial fruit production - not a simple task.

Bananas are actually a giant grass. There are hundreds of varieties in existence, most descended from two wild species, *Musa acuminata* and *Musa balbisiana*, in various ratios. After fruiting, the stem is cut down causing the base to produce suckers, which are cut off and replanted. Unfortunately this means they're genetically identical clones: once a pathogen overcomes their defenses, it can quickly wipe them out! As disturbing as this threat to our much-loved fruit is, a much worse possibility is that TR4 could also wipe out the Cavendish's starchy cousins, the plantains. Ranking fourth as a source of calories worldwide, the disappearance of plantains could be truly disastrous.

***Musa x paradisiaca*, Australian lady Finger Bananas, watercolor on paper, ©Peta Bigum, 2014.**



***Musa x paradisiaca*, Bananas, watercolor on paper, ©Beverly Allen, 2002.**

Unfortunately for breeders many banana varieties are triploid, having three sets of chromosomes. On the plus side, that's why they don't have seeds but it also makes them infertile and impossible to breed from. Worse yet, even fertile varieties suffer from low seed set and poor viability. Various programs have been working to produce a replacement for many years. A number of new varieties have resulted but the fruit lack acceptable shelf-life: fine for local consumption but unsuitable for our expectations of eating bananas in cold climes.

Some authors suggest that Genetic Modification (GM) may provide a solution. This typically involves the introduction of genes from totally unrelated sources (even fish!) to create disease resistant varieties. But fungal diseases generally prove unresponsive to GM techniques and regardless, the new variety must still meet all commercial requirements including acceptance in markets around the world, another potential challenge for GM solutions.

Will an answer be found? Will we expand our banana palate and try other species? Or will we someday be singing the no banana blues once again? 🍌

